

Role of data in informing policy, improving practices and achieving sustainability goals

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The Sustainability Challenge in Agriculture

- Three pillars of **agricultural sustainability**:

1. **Economic:** Profitability, market resilience, long-term viability
2. **Environmental:** Soil health, biodiversity, water, climate
3. **Social:** Rural vitality, farmer well-being, food security

- **Key challenges:**

- Balancing **productivity** with **environmental protection**
- Adapting to **climate change**
- Maintaining **farm incomes**

- **EU policy context:**

- Common Agricultural Policy (**CAP**) reform, European Green Deal, Farm to Fork Strategy etc.

- **Global policy context:**

- Paris Agreement (limiting global warming to 1.5°C),
- UN Sustainable Development Goals



So how can FSDN contribute to this process?



1. Supporting Common Agricultural Policy (CAP) Reforms:

- **Economic Data:** More targeted subsidies and direct payments, enhancing financial support for farms
- **Agri-environmental Schemes:** Guide the development of eco-schemes for biodiversity, emissions reduction and land conservation

2. European Green Deal & Farm to Fork Strategy:

- **Measuring Environmental Impact:** Tracking emissions, water use and biodiversity
- **Sustainable Practices:** Monitor development of organic farming



3. Rural Development Policy:

- **Social Sustainability:** Addressing rural depopulation and ensuring vibrant communities
- **Innovation & Diversification:** Supporting diversification particularly in areas where farm incomes are low

So how can FSDN contribute to this process?

4. Progress on Sustainable Development Goals (SDGs):

- **Tracking SDGs:** Supports EU commitments to SDGs



5. Balancing Trade-offs:



- **Integrated Decision-Making:** Balancing economic viability, environmental protection, and social well-being in policy choices

6. Accountability & Transparency:

Accountability

- **Policy Evaluation:** Monitoring success of policies in improving farm income, biodiversity and rural job creation
- **Public Expectations:** Better align policies with growing public demand for sustainable practices

Ability to Monitor Success Stories in Ag.

Are things improving?

a) Increased Adoption of Precision Agriculture Techniques

- Impact: better **resource use efficiency** (e.g., reduced fertilizer and pesticide use)



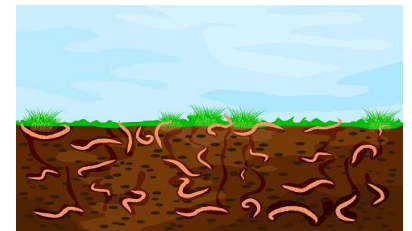
b) Growth in Organic Farming Area

- Impact: profitability of **organic farms vs. conventional farms**



c) Improvements in Nutrient Use Efficiency

- Impact: improvements in NUE leading to **reduced nutrient runoff & improved water quality**



Ability to Monitor Areas of Stagnation in Ag.

Are things getting worse?

a) Slow Progress in Reducing Agricultural GHG Emissions

- Impact: indicate which **agricultural sectors** are making **progress** and which are **lagging**



b) Trend in Farmland Biodiversity

- Impact: Show **decline/improvement** in biodiversity indicator



c) Ageing Farm Population and Succession Challenges

- Impact: show **demographic shifts** in the farming population over time



Ability to Monitor Adoption of Sustainable Practices in Ag.

How are things getting better?

a) Effectiveness of Policy Incentives

- correlation between **adoption rates** and **CAP eco-scheme participation**



b) Benefit of Access to Knowledge and Technology

- education level: **adoption rates** across different **farmer education levels**
- advisory support: the **impact of farm advisory system** participation **on practice adoption**



c) Relevance of Farm Characteristics

- show the relationship between **farm size** and **adoption rates**
- detect **regional pattern** of **adoption rates**



Ability to Monitor the Impact of Adoption of Sustainable Practices

Can we demonstrate the benefits of doing things better?

a) Improved Economic Performance

- profitability: comparing **farm income** for tech **adopters** vs. **non-adopters**
- resilience: **income stability/volatility** resulting from extreme weather



b) Enhanced Environmental Outcomes

- GHG emissions: Calculate **emission reductions** attributable to **specific practices**



c) Beneficial Social Impacts

- farmer well-being: **work-life balance** and **job satisfaction**
- rural vitality: relationship between **practice adoption** and **broader rural development indicators**



Specific EU Policy Goals

a) Common Agricultural Policy (CAP) 2023-2027

- specific objectives related to environment, climate, and rural development

b) European Green Deal and Farm to Fork Strategy

• Key targets for 2030:

- 50% reduction in **pesticide** use
- 20% reduction in **fertilizer** use
- 25% of agricultural land under **organic farming**
- 10% of agricultural area under **high-diversity landscape features**

c) EU Biodiversity Strategy for 2030

- Relevant targets for agriculture:
 - Reverse the decline of **pollinators**
 - Reduce the overall use of **chemical pesticides** by 50% and **high-risk pesticides** by 50%

d) EU Climate Law and Member States Climate Plans

- agricultural sector's role in achieving **climate neutrality** by 2050
- Member State commitments for **reducing agricultural emissions**



Measuring Progress Towards EU Policy Goals (examples)

Linking FSDN Indicators to Policy Targets

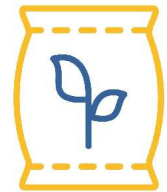
a) Pesticide Use Reduction

- Metric: **expenditure** on **plant protection products**, area treated
- Analysis: Calculate **pesticide use intensity** and changes over time



b) Fertilizer Use Efficiency

- Metric: **Fertiliser expenditure**, crop yields, **soil nutrient balances**
- Analysis: Calculate **Nutrient Use Efficiency (NUE)** trends across different farm types



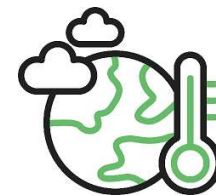
c) Organic Farming Expansion

- FSDN indicators: Organic **land use data**
- Analysis: **Track** organic conversion rates and **economic performance** of organic vs. conventional farms



d) Climate Action in Agriculture

- FSDN indicators: **Livestock units**, **manure management practices**
- Analysis: **Estimate GHG emissions** at farm level using IPCC methodologies



Measuring Progress Towards EU Policy Goals

- Data Visualisation
- Interactive Element: Policy Target Dashboard
 - An interactive dashboard that allows exploration of progress towards different policy targets
 - “Slicers” for time period, region and farm type



Case Study: Irish Agriculture

Tracking Sustainability Indicators for Irish Agriculture

a) Environmental Sustainability

- **GHG and Ammonia** emissions from Irish agriculture
 - with focus on methane from livestock
- **Water quality proxy** indicators (Nitrogen use efficiency)
- **Biodiversity** metrics (e.g., habitat quantity/ quality)



b) Social Sustainability

- **Age structure** of Irish farmers and succession plans
- **Off-farm employment** rates



8. Case Study: Irish Agriculture

Tracking Sustainable Practice Adoption in Ireland

a) Nutrient Management

- Uptake of use of **low emission fertilisers**
- Impact on GHG and ammonia emissions



b) Low-Emission Slurry Spreading

- Adoption rates of **low-emission slurry spreading (LESS) technologies**
- Impact on ammonia emissions and **nutrient use efficiency**

c) Organic Farming

- Current status and growth trends in **organic production**
- Comparison of **organic farm** with **conventional farm** performance



Conclusions and Future Directions

- FSDN transition makes sense:

- FSDN data **crucial** for **evidence-based** policymaking
- **Data-driven approaches** enable **targeted interventions**

- Future research opportunities involving FSDN:

- Integrating FSDN with **other data sources** (e.g., Earth observation data)
- Developing **more robust social** sustainability **indicators**

- Role for Stakeholders:

- Policymakers: Invest in **data infrastructure** and **analysis capabilities**
- Farmers: **Engage** with **data collection efforts** and **use insights** for **decision-making**
- Researchers: Develop **innovative methods** to **extract insights** from complex datasets

